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المدرسة العليا في علوم التغذية
و الصناعات الغذائية
Ecole Supérieure des Sciences
de l'Aliment & des Industries
Agroalimentaires



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Making Nutrition a Development Priority in Africa



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JBTA 2021 Invited Speakers Abstracts

01

SUSTAINABLE AND SELECTIVE RECOVERY OF HIGH ADDED-VALUE PRODUCTS FROM PLANTS AND FOOD INDUSTRY WASTE USING THREE PHASE PARTITIONING: A FOCUS ON THE USE OF PROTEASES AS TENDERIZING AND MILK-CLOTTING AGENTS

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The sustainability of production and consumption by humans is a growing concern. In fact, applications of a sustainability framework to raw materials of plant and/or fruit by-products are increasing worldwide. Many biomolecules of interest can be recovered, from which the most important economically include the enzymes, extensively used by food industry. Among enzymes, proteases can be used as cheese making or meat tenderizing agents (Gagaoua *et al.* 2021). Further, in the last decade, growing interest has emerged toward plant proteases and their application in peptide synthesis/production. In this context and in the frame of the 2030 Agenda for Sustainable Development, one of our objectives is to use endemic plants and food industry waste as resources to recover their proteases as high added-value products using the bioseparation technique Three Phase Partitioning (TPP) (Gagaoua, 2021). Among the aqueous purification systems, TPP is an alternative and cost-effective non-chromatography bioseparation method used for the extraction, concentration and recovery/purification of proteases, from different biological sources (microorganisms, plants and animals). This presentation will serve as a one-stop-reference to give a snapshot about the studies that used over the last two decades TPP to purify enzymes, more specifically proteases, with high and acceptable purity and their use for milk-clotting and meat tenderization.

Keywords: Three Phase Partitioning, Enzymes purification, Proteases, Endemic plants, Milk-clotting; Artificial meat tenderization; Proteolysis; Peptides.

02

CHEMISTRY AND DIVERSITY OF HONEYBEE PROPOLIS

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Propolis, a natural substance collected by honeybees from buds and exudates of certain trees and plants to protect their beehive from enemies, is used in folk medicines in many regions of the world and has been reported to have various biological activities such as antibacterial, antiviral, anti-inflammatory, and anticancer properties. Propolis is extensively used in food and beverages to improve health and prevent such diseases as inflammation, heart disease, diabetes, and cancer. Propolis contains a rich variety of chemical compounds, depending on the vegetation at the site of collection. Most propolis available in various parts of the world is derived from poplar buds, and it contains flavonoids and phenolic acids and their esters. On the other hand, southeastern Brazilian propolis derived from the buds of *Baccharis dracunculifolia*, contains prenylated cinnamic acid derivatives. The propolis from Okinawa, Japan, contains some prenylflavonoids not seen in other regions such as Europe and Brazil, suggesting that the plant origin of Okinawan propolis is a particular plant that grows in Okinawa. In 2007 we found the plant origin of Okinawan propolis is *Macaranga tanarius* by observation of honeybee behavior and phytochemical analysis. Then similar type of propolis, called as "pacific propolis", were also found in the Solomon Island and Hawaii. Recently we have studied other types of propolis from south eastern Asia such as Thailand and Indonesia. We here present the chemistry and diversity of propolis from various places of the world.

Keywords: Propolis Honeybee, Chemical compounds, world's region.

03

GLYCAN: POLYVALENT MOLECULES FOR FUNCTIONAL FOOD

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The terms glycan and polysaccharide are defined by IUPAC as synonyms meaning "compounds consisting of a large number of monosaccharides linked glycosidically". In practice the term glycan may also be used to refer to the carbohydrate portion of a glycoconjugate. Glycans have long been known to play major metabolic, structural and physical roles in many applications, especially in food technology. Such properties can only explain some of the remarkable complexity and organismal diversity of glycans in nature. They may be broadly grouped into different classes stemming from vegetable sources, such as cactus pectin in our study. Glycan have promising functionalities as single carbohydrate molecules, as oligosaccharides, as huge biopolymers and as 3D networks structures. One of the most important functional property of polysaccharides in aqueous solutions is the ability to interact with water and other small ions to form gels. Some hydrogels can be responsive to environmental stimuli and giving rise to interesting activity as smart hydrogels with great applications in functional food. Finally, a small piece of glycans can play crucial role at molecular level by enhancing human health because of their positive interactions with gut microflora and immune system or as bioactive molecules against pathogens. Carbohydrate based vaccines are a new horizon in the development of food bioactive supplements or health boosting dietary oral formulations.

Keywords: Glycan, structure, food technology, bioactivity

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At the time when modern medicine is confronted with the problem of antibiotic resistance, so-called natural therapies are attracting renewed interest. As honey has a powerful antibacterial property, the antimicrobial effects of 65 samples of Algerian and imported honeys of different floral and geographical origins, a sample of honey from a hive fed excessively with sugar syrup (continuous feeding) and a sample of artificial sugar syrup were tested against *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*, and several physicochemical and biochemical parameters of the honeys were studied. *Escherichia coli* were the most sensitive microorganism while *Pseudomonas aeruginosa* showed a clear resistance to the antimicrobial activity of honey. A significant correlation between diastase activity and invertase activity on the one hand and bacterial inhibition on the other hand was observed; the antibacterial activity of honeys would thus be correlated with the freshness parameters of the honeys. The Algerian honeys showed a higher antibacterial effect than the imported honeys; the PCA allowed separating the samples into two distinct groups. Honey could be used as a source of bioactive compounds with the potential to treat pathogenic bacterial infections.

Keywords: Honey; antibacterial activity; enzymatic activities.

02

VALORIZATION OF PINE CONE *PINUS PINEA L.*, BY THE SYNTHESIS OF ACTIVATED CARBON, CHARACTERIZATION STUDY

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CORRELATIONS STUDY BETWEEN SOME BIOACTIVE COMPOUNDS OF ALGERIAN AND IMPORTED HONEYS AND THEIR ANTIBACTERIAL EFFECT

A-5

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The recovery of pinion pine by-products through the synthesis of activated carbon is a quick fix to the large deposits of pinecones, rejected at the end of the fruit extraction process.

Multiple works have shown that pine-cones were an interesting resource of resins and essential oils, so it is about the wood of the cones that our study focused on, by finding an alternative to this waste and solutes the needs of many industrial activities. Indeed, the production of activated carbon is part of an approach to preserve the environment from the accumulation of solid wastes, even if it is about a forest by-product. Also, with an objective to reintroduce these wood pines in different applications, such as, water treatments, production of food supplements, etc. Thus, producing activated carbon from lignocellulosic materials would contribute both to the protection of the environment, and the valorization of pine cones. Finally, the production of activated carbon is an excellent way to make profits with these forests by-products, since the transformation is simple and allows a simple application in different fields of the obtained product. As explained above, the applications of activated carbon are very diverse, to cite some examples of the most well-known uses, such as water treatment, production of food supplements, discoloration of vegetable oils, discoloration of sugars, purification of air, etc. It also applied in cosmetics and pharmaceuticals fields.

Keywords: Activated carbon; biosorbant, valorization, forest by-products.

03

RECOVERY OF CAROTENOIDS FROM THE SPENT BIOMASS OF *SPIRULINA PLATENSIS* OBTAINED AFTER EXTRACTION OF C-PHYCOCYANIN

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Changes in consumer food preferences are increasing due to the growing awareness of the positive impact of healthy food in promoting good health, improving well-being and the quality of life, which make functional foods more influential in the global food system. In food formulations, many colorants are used to make foods more appealing and therefore boost their consumption. However, the growing demand for natural colorants which may be healthier than synthetic colorants is driving the food industry to focus on researching and developing more stable and functional natural colorants as substitutes for artificial ones. Microalgae, in particular *Spirulina platensis*, are an excellent source of natural food colorants such as C-phycocyanin, chlorophylls and carotenoids. However, the focus has always been on maximizing recovery of C-phycocyanin leaving chlorophylls and carotenoids in depleted biomass that is often unused, resulting in economic and energy losses, as well as that an overconsumption of natural resources. Therefore, the main objective of the present work is the extraction assisted by the pulsed electric field (PEF) of C-phycocyanin, followed by the valorization of the biomass waste for the extraction and characterization of carotenoids, using supramolecular solvents. The results obtained were marked by yields of 17.70 ± 2.08 mg/g and 0.67 ± 0.09 mg/g of C-phycocyanin and carotenoids respectively. Qualitative analysis of carotenoids by liquid chromatography equipped with mass spectrometry was used to identify and quantify the extracted carotenoids.

Keywords: *Spirulina*, C-phycocyanin, carotenoids, pulsed electric field, supramolecular solvent.

04

FORMULATION TEST OF AN ENERGY BAR BASED ON ALGERIAN LOCAL PRODUCTS AND MEASUREMENT OF ITS SENSORY PERCEPTION

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Today, energy bars are an integral part of the lives of athletes. An energy bar is a cereal or non-cereal bar composed of high-calorie ingredients, designed for people who do not have time to eat a meal, it helps support physical efforts by providing essential nutrients to muscles and to the organism. Despite all the benefits of this type of bar, they remain unknown in Algeria. We have therefore made the choice to make these bars known by formulating a 100% Algerian energy bar. For better digestibility, and in order to enhance an endemic tree in Algeria, we initially thought of making it with carob, a local product rich in dietary fiber and known for its dietary and therapeutic effects. We added Beni Maouche figs and Deglet Nour date syrup for the energy side. We have also chosen to replace the use of edible oil or butter with olive oil from Kabylie, not only to enhance this local product, and for its richness in monounsaturated fatty acids, but also for all its dietary and nutritional properties. Finally, we have enriched it with natural antioxidants thanks to the addition of dried fruits (almonds, peanuts, raisins, etc.). We have thus achieved our objectives, namely to produce a bar that is both energetic, of plant origin but also rich in Algerian local products and natural antioxidants. A sensory analysis based on a questionnaire was carried out to assess the acceptability of this formula. All the tasters highly appreciated this bar.

Keywords: Carob, Beni Maouche fig, Deglet Nour, olive oil, energy bar, natural antioxidants.

05

FORMULATION TEST OF HYPER-PROTEIN COOKIE BY INCORPORATING SPIRULINA (*SPIRULINA PLATENSIS*)

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Spirulina is one of a very rich in protein (70%) food supplements and recognized for its nutritional and therapeutic values. The objective of this study is to formulate cookies enriched with spirulina. The study focused on the powder of a blue-green micro-alga called spirulina (*Spirulina platensis* SP) and soft wheat flour used for cookie in addition to other ingredients. The manufacturer's formulation is adapted by going through the following steps ; mixing of ingredients, creaming, kneading, shaping, cooking and packaging. Five cookies were made; the

control cookie (not enriched with spirulina) ; four cookies enriched with 0.5, 1, 1.5 and 2% of spirulina respectively. Physical, physico-chemical, microbiological, sensory and economic analyses of the finished product were performed. The results show that the rate of total protein and minerals increases significantly with spirulina integrated (16 and 1.37%MS) in comparison with the control cookie 8 and 1.24 %MS respectively. In contrary, fat and carbohydrate content with an average of 25 and 46%MS respectively. Spirulina-enriched cookies comply with the standards required by the JORA, which means that this alga has not influenced their microbiological quality. Physical evaluation of cookies shows that SP incorporation significantly increases the diameter, spread and surface area of the cookies as opposed to weight and thickness of cookies. The results of the sensory analyses presented an overall acceptability of taste, color, texture and flavor. Economic study results of cookies showed that the price of a cookies packet increases with SP incorporation up to 114.6 DA in comparison with not enriched cookies packet with SP (90 DA/200g). The formulation of a functional food rich with vegetable proteins and balanced on the nutritional and sensory level is currently in great demand. Because of these properties, spirulina is a food source that deserves a special attention for its development in Algeria.

Keywords: spirulina, cookie, proteins, nutritional value, sensory value.

06

DEVELOPMENT OF A NEW FOOD PRODUCT: BUTTER ENRICHED WITH MELON (*Cucumis melo*) RIND POWDER FROM LOCAL PRODUCTION, EL-TARF, ALGERIA

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The aim of this work is the development of a new dairy food product, butter, enriched with melon by-product powder, the rind. Melon (*Cucumis melo*) is considered as a local product of

the region of El-Tarf, Algeria. The butter which was the subject of this work was prepared on an industrial scale according to the standard scheme for the manufacture of a pasteurized industrial butter applied at the level of the national dairy industry of Edough, Annaba (Algeria) with a modification relating to the addition of melon powder as a dry ingredient in the aqueous phase. Furthermore, control butter was also prepared. The two samples produced were analyzed for their physicochemical, microbiological and sensory quality during a storage period of two months. The results showed that the addition of the melon rind powder had a significant positive or negative effect on the physicochemical properties of the butter (decreasing in pH and moisture and increasing in fat content). The microbiological quality of the butter samples deteriorated during storage. As for the sensory quality, this was not influenced by the addition of the melon powder where butters were appreciated by the tasters.

Keywords: Butter, Melon rind powder, Quality Analysis.

watermelon rind into jam with four formulations (C1, C2, C3 and C4) without and with the addition of honey with different proportions (0 g, 20 g, 40 g and 60 g), on the other hand to evaluate their microbiological, sensory and physico-chemical qualities as well as their antioxidant properties. The results of physico-chemical analyzes indicate that the jams studied have properties quite comparable to other jams from other fruits. The microbiological analyzes carried out revealed that the jams produced are free from all germs of contamination. The sensory analysis leads to the conclusion that C1 and C3 jams are the most appreciated by tasters with a percentage of 56% compared to C2 and C4 jams with a rate of 44%. In addition, processed jams are an important source of antioxidants (polyphenols, flavonoids, flavonols, carotenoids, lycopene and vitamin C) and show good antioxidant activity. In conclusion, elaborate watermelon rind jams present technological parameters competing with other known jams and which allow its successful marketing.

Keywords: Watermelon Rind; Jam; Quality; Antioxidants; Antioxidant activity.

06

VALORIZATION OF WATERMELON RIND: FORMULATION OF JAM ENRICHED WITH HONEY AND EVALUATION OF ITS QUALITY

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The main objective of this study is the development of a jam enriched with honey based on a watermelon waste: the rind for its valorization. The variety of watermelon (*Citrullus lanatus*) used in this study was purchased from the local market of Baccaro in Bejaia city and the honey added during the preparation of this jam was purchased from a beekeeper in the Ait Smail region of Bejaia. In this study, we were interested on the one hand in developing an appropriate recipe for the transformation of

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01

OPTIMIZATION OF EXTRACTION AND DOSAGE OF BIOACTIVE COMPOUNDS FROM NIGELLA SATIVA SEEDS

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Our work aims to optimize extraction by maceration in ethanol and the dosage of bioactive compounds from *Nigella sativa* seeds and the determination of their chemical composition. Phytochemical analysis was carried out by assaying total soluble phenols (TSP), flavonoids, and studying the anti-radical activity DPPH and ABTS. At the end of these assays, the highest rate obtained from the TSP is 520.16 ± 6.80 mg EAG/100g of D40 extract and a concentration of 57.76 ± 1.77 et 51.99 ± 1.00 mg QE/100g of extract in Q40 and D40 extracts respectively, in flavonoids. The results of the antioxidant activity are in favor of the S60 and S80 extracts with an optimum percentage of neutralization of the DPPH and ABTS radicals. The antimicrobial tests of the extracts were carried out on two

pathogenic strains by the disk method, the D80 and S40 extracts prove to be very effective against *Escherichia coli* (35mm in diameter) and *Staphylococcus aureus* (20mm in diameter) respectively. In light of these results, we deduce that the concentration of the solvent and the mass of the sample significantly influence the extraction of the bioactive compounds. In order to enhance our results, the extract of the seeds of *Nigella sativa* richest in antioxidants was fixed and was incorporate into a formulation of a functional food (a yoghurt enriched with 0,5% extract after elimination of the solvent), physic-chemical, biochemical and microbiological analyzes were carried out on the latter, and is compared with a control yoghurt where the results indicate that the added extract has significantly improved the nutritional and microbiological quality of the yoghurt. It is desirable to complete this study with more efficient qualitative and quantitative tests, to optimize other parameters that influence the phenomenon of diffusion.

Keywords: *Nigella sativa*, bioactive compound, optimization, antioxidant activity, antimicrobial activity, aliment functional, yoghurt.

02

DEVELOPMENT OF A BIOFILM BASED ON AGAR AGAR AND ESSENTIAL OIL OF ROSEMARY (*Rosmarinus officinalis*) AS A PRESERVATIVE OF FRESH MEAT

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Rosmarinus officinalis is highly known for its antioxidant and antimicrobial effects. The present work aims to explore the preservative properties contained in the essential oils of *Rosmarinus officinalis*. It consists in developing a biofilm with a thickness of 5mm, based on an optimized mixture of essential oil of Rosemary and Agar Agar. Some physicochemical analyzes were carried out on beef (*Bos Taurus*) in order to assess the effects of contact with this gel on the meat. Under similar storage conditions of temperature 22-27°C and humidity, a comparative analysis between the physico-chemical data of the batches of meat in contact with the biofilm, with those sheltered from the biofilm. These data relate to Determination of pH. The

production of ammonia NH3 and Hydrogen sulphide (H2S), using a solution of Lead Acetate (CH3COOPb). The comparative study using the Mann Whitney U test of batches of meat indicates differences, although slightly significant, in these three parameters between the meats in contact or not with the gel: (PH : 6.81 ± 0.35 95% CI 6.11-6.94 for the meats vs. 5.9 ± 0.2 95% IC 5.82.93 U-test = 9.2 P=0.09); 5.11 ± 0.11 95% IC 5.25.63 vs 4.90 95% IC 4.85-5.19 U test = 5.25 P=0.08 for the production of NH3 and color change) and 5.27 ± 1.19 95% IC 4.96-5.29 vs 3.75 ± 0.26 95% IC 3.69- 4.01 U test P=0.053) for the production of H2S. The results seem to be encouraging but not conclusive due to the size of the two batches. Further complementary physico-chemical analyzes are necessary to consider. The application of rosemary-based gel could be an alternative to compensate for the nutritional alterations that occur in meat during slow refrigeration before its consumption.

Keywords: Agar agar; Biofilm; Rosemary.

03

CHANGES IN FATTY ACIDS PROFILE, MONOSACCHARIDE PROFILE AND PROTEIN CONTENT DURING BATCH GROWTH OF *Isochrysis galbana* (T.iso)

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To be used in feeding marine organisms, microalgae have to meet different requirements based on growth rate, proper size for ingestion and digestible cell wall to make the nutrients available and high biochemical content such as lipids, protein and carbohydrates contents. In fact, the quality and quantity of lipids are of great importance in the nutritional value of microalgae in aquaculture. To investigate the nutritional value of the marine micro-alga *Isochrysis galbana* Tahitian *Isochrysis* strain (T.iso) as an alternative feed for aquaculture during culture age, its biochemical composition was studied under autotrophic and controlled culture conditions at different growth stages: exponential phase, early and late stationary phases and decay phase. Analysis showed that C14:0, C16:0, C16:1, C18:4 (n-3) and C22:6 (n-3) were the most abundant fatty acids in this alga

at different growth stages. The highest values of monounsaturated fatty acids were recorded at the late stationary and the decay phases. However, the highest levels of polyunsaturated fatty acids were observed at the early stationary phase. At all growth stages, *I. galbana* (T.iso) contained arabinose, xylose, mannose, galactose and glucose. Glucose represented the main sugar, and its content per dry alga biomass weight increased with increasing age of the culture and reached about fourfold in the decay phase. The maximum protein content was also observed during this last phase.

Keywords: fatty acids, growth phases, *Isochrysis galbana* (T.iso), monosaccharides, protein.

04

SUITABILITY FOR BREAD-MAKING OF SOME DURUM WHEAT CULTIVARS GROWN IN ALGERIA

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The durum wheat (*Triticum durum* Desf.) cultivars characterized by a high productivity have poor aptitude for industrial processing. This is a concern for the food industries. A study on the suitability for breadmaking of four varieties of durum wheat namely, Ofanto, Simeto, Wahbi and Amar6 grown in Algeria was conducted. The alveographic test results showed a better baking strength (w) of Simeto and Wahbi than the other two varieties (Wahbi and Amar6). The standardized breadmaking test determining the bread quality and behavior dough revealed that the baking value of the varieties Ofanto, Simeto and Wahbi are >200 while that Amar 6 does not exceed 100. We concluded that only semolina of the cultivars: Ofanto, Simeto and Wahbi can be oriented for bread making. The correlation test showed that the baking value is significantly correlated ($p<0.05$) with the rheological tests.

Keywords: durum wheat, baking value, baking strength, bread making.

05

SYNTHESIS, CHARACTERIZATION AND SOME SURFACE PROPERTIES OF NOVEL AMINO ACID-BASED SURFACTANTS

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Surfactants are widely used in the most important field such as drug carriers, microencapsulation, DNA transfection, lubricants, cosmetics and detergency formulation, food processing industry and as insecticide, herbicides and plant growth inhibitors for agricultural means...etc. this huge area of applications makes the use of surfactants been limited by issues of the bio-degradability, toxicity, efficiency and cost. In the last decade, new eco-friendly surfactants have been synthesized, obtained from the cheaper feed stocks of amino acids, carbohydrates oils and fats to replace the non-renewable petroleum chemicals. In the present work, we have focused on the synthesis of new surfactant namely n-alkanesulfonamido acetate acid having a formula n-alkane-SO₂-NH-CH(CH₃)-COO-Na⁺ where n-alkane: dodecane, tetradecane, hexa-decane and octadecane, which are synthesized using DL Alanine as starting materials. The synthesized surfactants were then characterized using FTIR, GC-MS analysis and UPLC-Mass spectrometry to confirm the composition of the synthesized product. Moreover, the physicochemical parameters of anionic derived surfactant were determined in this study. First, the critical micelle concentration, surface tension and conductimetry measurements at room temperature (25°C) were performed. The foaming power was also determined by the Bartsch method, and the R5 parameter was calculated to estimate the stability of the foam formed. The results obtained show clearly that these DL-Alanine-based surfactants possess good surface properties. Otherwise, the investigations lead to highlight the influence on the surface properties of the addition of a methyl group in the hydrophilic part. It is also shown that surfactants could be exploited in detergency, formulations, and industrial applications.

Keywords: Surfactants, amino acid, sulfonamide.

FREQUENCY OF GOAT MEAT CONSUMPTION IN KABYLIA REGION (BEJAIA, BOUIRA & TIZI-OUZOU) IN ALGERIA COMPARED TO LAMB, BEEF, HORSE, CAMEL AND CHICKEN: RESULTS OF AN ONLINE SURVEY

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This study aimed to investigate using on an online survey, the frequency of meat consumption and preferences from several animal origins in the region of Kabylia in Algeria within 3 provinces (Tizi-Ouzou, Béjaia and Bouira). In this communication, we examine in a specific manner the consumption of goat meat in comparison to lamb, beef, horse, camel and chicken meats through an exploratory survey on a homogenous gender consumer's population of different ages. The main objectives are i) to obtain the first overview of meat consumption frequencies in Kabylia region, ii) to identify the preferences of the targeted meat sources and iii) to identify the main drivers and reasons of goat meat consumption in Kabylia. The questionnaire revealed that 95.6% of the respondents are consumers of meat and/or meat products (n = 636) versus 4.4% (n = 29) that had never consumed meat. Among the meat consumers, 64.8% (n = 412) eat goat meat and meat products either occasionally or rarely while only 8% are frequent consumers of goat meat. Chicken is the only meat that is consumed by all the respondents and 84.0% (n=534) of them declared consume it always, followed by beef (55.9%) and lamb (18.7%). Further, chicken is the most liked meat compared to the others sources. Goat meat seemed to be of an intermediate appreciation unlike camel and horse meats, which are the main disliked meats. The survey also revealed that the main reasons for consuming goat meat and meat products were for the nutritional quality (63.5%), sensorial quality (51.4%), safety quality (31.2%) and price (13%). This study is the first to highlight in the Kabylia region the trend of meat consumption namely that of goat meat among several species, hence revealing that the major consumed meat is from chicken followed by beef and lamb. Goat meat is weakly consumed, while camel and horse are never or rarely. We further examine in this study the main drivers of consumptions and appreciation of goat meat.

Keywords: Meat consumption; Algeria; consumer preference; livestock; online questionnaire.

BIOLOGICAL ACTIVITIES OF THE ESSENTIAL OIL OF *Rosmarinus officinalis* AND ITS INCORPORATION INTO FRESH CHEESE AS A FOOD ADDITIVE

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This study aimed to investigate using on an online survey, the Medicinal plants have been known and used for a long time for their countless biological and therapeutic virtues and properties. *Rosmarinus officinalis* is the subject of this work which aims to enhance their biological properties and use it as a food additive. Rosemary essential oil, stored away from light, was obtained from an essential oil extraction unit near Algiers. The antimicrobial activity of the essential oil was evaluated by the well method against six target microorganisms (four bacteria and two fungi) involved in food spoilage and food poisoning. The antioxidant potential of rosemary essential oil was evaluated by the DPPH method. The incorporation of rosemary essential oil was carried out by two different methods (immersion and sprinkling) at increasing concentrations during the manufacture of fresh cheese (Jben). The monitoring of the microbiological quality of fresh cheese mixed with HER was ensured for ten days. The results showed a good antimicrobial activity of HER against the target microorganisms tested and a powerful antioxidant power with an interesting anti-radical efficacy for an application as a food additive. The results revealed that the sprinkling method showed an appreciable and better preservation compared to the immersion method in terms of microbiological quality under the operating conditions used. On the other hand, the control cheese became inedible from the 4th day.

Keywords: *Rosmarinus officinalis*, antimicrobial, antioxidant, food additives.

08

EFFECT OF ADMINISTRATION OF GINSENG SOLUTION PANAX GINSENG ON BLOOD COAGULATION PARAMETERS AMONG A POPULATION OF MICE (*Mus Musculus*)

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The current study aims to investigate the anticoagulant potential of Panax ginseng in vitro. We assessed and compared variations in platelet levels, prothrombin time, and activated partial thromboplastin time in 68 *Mus Musculus* mice divided into three groups: 23 mice fed with 5 percent Panax notoginseng (450mg/kg), 22 mice force-fed with distilled water, and 23 mice force-fed with rice flour (450mg/kg). Our results showed a significant prolongation of the activated partial thromboplastin time following prolonged force-feeding with Panax ginseng solution: At T0 13±6 sec vs 22.6±1.5 s (Zwilcoxon = -4.19 / P <0.01) at the end of the force-feeding period. The active prothrombin time was 12.5 sec at the beginning of the experiment and 20.45 sec after 45 days of ginseng gavage (Z wilcoxon = -4.27 / P 0.01). Furthermore, the platelet count did not differ significantly across all groups or over the course of the experiment (Z wilcoxon = -4.14 / P = 0.11). This study concludes that panax ginseng has a strong anticoagulant potential. Further research into the antiplatelet potential of panax ginseng should be conducted using other biological indicators, specifically the effect of ginseng on platelet functions.

Keywords: Ginseng, Blood coagulation, Mice, Anticoagulant Properties, antiplatelet agent.

09

EVALUATION OF THE PHYSICOCHEMICAL QUALITY OF HONEYS PRODUCED IN THE NORTH OF ALGERIA

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Honey is a widely recommended bioproduct for its therapeutic benefits. These benefits are closely related to its physico-chemical quality. This study was therefore conducted with the aim of evaluating the quality of honey produced in different regions of northern Algeria. A total of thirty-eight (38) honey samples were collected from beekeepers, covering sixteen (16) wilayas (Algiers, Blida, Tipaza, Médéa, Djelfa, Tizi Ouzou, Béjaia, Chlef, Mostaganem, Tiaret, Ain Defla, Skikda, Jijel, Annaba, El Taref and Mila). Five physicochemical parameters were considered in accordance with international regulations (water content, 5-Hydroxymethyl furfural (HMF) content, pH, free acidity and electrical conductivity). The results obtained revealed humidity levels between 14.4 and 19.8%, an HMF content between 0 and 61.1mg/kg, a pH between 3.5 and 5.2, a free acidity between 5.0 and 49.5 meq/kg and a conductivity between 87.1 and 858.1 μ S/cm. All the results found are in accordance with the standards recommended by the Codex Alimentarius for all the parameters studied. However, some maximum values recorded for HMF are higher than the standards with a prevalence of 13.2% of non-compliant samples, indicating either non-compliance with the storage conditions of the honey or its aging.

Keywords: honey, physicochemical quality, North Algeria.

FORMULATION OF JELLIES BASED ON DATE MOLASSES AND PECTIN EXTRACTED FROM ORANGE PEEL

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Pectin, an anionic heteropolysaccharide, is widely used in food industry as stabilizer or gelling agent. In this study, pectin extracted from orange peel (OPP) using acidic method was characterized then tested as a gelling agent in an original formulation of date molasses-based jellies. The physicochemical results lead to classify the OPP as a highly methylated pectin. Moreover, OPP displayed antioxidant activity, in a dose dependent manner, against DPPH and ABTS radicals and exhibited an efficient antibacterial activity at 10 mg mL⁻¹ against *Staphylococcus aureus* and *Escherichia coli*. On the other hand, the effect of OPP concentration (2%, 2.5% and 3% (m/m Sugar: Date molasses) on the rheological and sensory properties of date molasses-based jellies (FJs) was assessed. Results showed that all formulations possess a gel-like viscoelastic behavior. The FJ (3% OPP) showed the highest gel stiffness and exhibited similar viscoelastic behavior to commercial pectin. On the sensory level, this same formulation was the most appreciated by panelists.

Keywords: Orange peel; Pectin; Date molasses; Jellies; Gelling.

EFFECT OF INCORPORATION OF LOCUST BEAN GUM ON THE PHYSICO-CHEMICAL AND ORGANOLEPTIC CHARACTERISTICS OF A DAIRY PRODUCT (PROCESSED CHEESE)

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The growth of the world population and the increase in the standard of living require the increased supply of foodstuffs. Cheese is an ancestral form of preservation of proteins, fat, as well as some calcium and phosphorus, whose nutritional and organoleptic qualities are appreciated by man or almost by all regions of the world. There is a very wide variety of cheese, depending on the nature of the milk and the technologies used. Processed cheese is a much more recent preparation, which has allowed a much more advanced stabilization of dairy proteins, while maintaining more or less the appearance of a cheese. Frequently used agents are gelatin, pectins, carrageenans, methylcellulose derivatives, gum arabic, starch, and galactomannans. The valorization of purified locust bean gum from the endosperm widely used in the formulation of several foods as a thickening, swelling, binding and stabilizing agent in preparations of emulsions such as processed cheese, dairy products, cosmetics and pharmaceutical industry. Can locust bean gum be used in processed cheese as a gelling agent? What is the ideal percentage of locust bean gum to give processed cheese acceptable to the consumer? The objective of our study is to study the effect of the incorporation of locust bean gum in processed cheese on the physico-chemical, microbiological and organoleptic characteristics. The incorporation of locust bean gum into 300g of processed cheese at different doses (0.1%; 0.5% and 1%) revealed that the 0.5% dose was acceptable by all the members of the tasting panel on the physicochemical and organoleptic with a viscous and elastic texture, a slightly sweet taste and a whitish color characteristic of cheeses.

Keywords: Formulation; Processed cheese, Locust bean gum, Incorporation.

FORMULATION OF JAM BASED ON BITTER CITRUS FRUITS: DESAMERIZATION TEST AND SENSORY QUALITY

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This work aims to compare the influence of the desamerization method on the sensory quality of two jams: bigarade and grapefruit. Salt, heat and water are considered to be driving elements in the desamerization operation. In this study, the salt factor was variable; six salt levels were set during this operation. They correspond to the six percentages (0%; 0.3125%; 0.625%; 1.25%; 2.5% and 5%) of salt taken according to the weight of the fruit. The results show that the bitterness disappeared completely for concentrations of 2.5% for bigarade and 5% for grapefruit. The results also show that it is the bitter orange jam, debittered with a salt concentration of 2.5%, which is the most popular. The preference test shows that it is the bigarade jam which is the most preferred for all the concentrations tested.

Keywords: Bigarade, desamerization, grapefruit, jam, sensory quality.

EFFECT OF THE INCORPORATION OF OLIVE LEAVES AQUEOUS EXTRACT ON PHYSICO-CHEMICAL AND BIOACTIVE PROPERTIES OF FILMS BASED ON CUTTLEFISH SKIN GELATIN

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The objective of this study was to investigate the effect of the incorporation of olive leaves aqueous extract (OLAE) on the physico-chemical and bioactive properties of gelatin-based films. Thus, OLAE was incorporated into the cuttlefish skin gelatin film-forming solutions at different concentrations ranging from 1 to 4 mg/mL (w extract/ v film-forming solution). The resulted films are then characterized. The results showed that the incorporation of OLAE into gelatin films improves significantly their optical barrier properties. Indeed, the enriched films are brown colored and have a UV barrier effect which increases according to the concentration of OLAE. However, the analysis of the thermal properties by the differential scanning calorimetry reveals a decrease in the glass transition temperature for the films added with OLAE compared to the control film. On the other hand, the antioxidant activity was evaluated by several in-vitro assays in order to test the antiradical activity, the reducing power and the inhibition of β -carotene bleaching. Interestingly, OLAE enriched films displayed higher antioxidant potential than gelatin films, which increased with the increasing amount of OLAE.

Keywords: olive leaves aqueous extract, gelatin films, antioxidant activity.

DESIGN AND CHARACTERIZATION OF NOVEL ECOFRIENDLY EUROPEAN FISH EEL GELATIN-BASED ELECTROSPUN MICROFIBERS APPLIED FOR FISH OIL ENCAPSULATION

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The present study aims at developing microfibers based on the European fish eel skin gelatin (ESG) using the electrospinning process and assessing its capacity to encapsulate eel oil (EO). According to the MEB micrographs, electrospinning of gelatin solution concentrated at 15 % (w/v) and dispersed in ethanol/water as solvent was efficient to produce microfibers. Further, variation in electrospinning parameters (voltage and feed solution) enhanced the electrospinnability of ESG solution and the quality of ESG-based microfibers. Moreover, ESG-based microfibers loaded with EO has been elaborated. The effects of the EO/ESG ratios (1/2 and 1:4, w/w) and two emulsification methods on the electrospun microfibers elaboration were assessed. The FTIR spectroscopy analysis confirmed the success of EO encapsulation. These results suggested that EO-loaded microfibers may be promising to be used as active encapsulating materials in food or nutraceutical/pharmaceutical sectors.

Keywords: Fish gelatin; electrospinning process; fish oil; microencapsulation.



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